A.D. 1873, 11th January. N° 111.

SPECIFICATION

OF

SAMUEL STELL.

APPARATUS FOR PREVENTING SMOKE AND ECONOMIZING FUEL IN FURNACES.

LONDON:
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1873.

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A.D. 1873, 11th January. N° 111.

Apparatus for Preventing Smoke and Economizing Fuel in Furnaces.

LETTERS PATENT to Samuel Stell, of Brunswick Street, Keighley, in the County of York, for the Invention of "IMPROVEMENTS IN APPARATUS FOR THE PREVENTION OF DENSE SMOKE BEING EMITTED FROM THE CHIMNEYS OF STEAM BOILER AND OTHER FURNACES, AND FOR ECONOMISING THE FUEL CONSUMED IN SUCH FURNACES."

Sealed the 8th July 1873, and dated the 11th January 1873.

PROVISIONAL SPECIFICATION left by the said Samuel Stell at the Office of the Commissioners of Patents, with his Petition, on the 11th January 1873.

I, SAMUEL STELL, of Brunswick Street, Keighley, in the County of York, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN APPARATUS FOR THE PREVENTION OF DENSE SMOKE BEING EMITTED FROM THE CHIMNEYS OF STEAM BOILER AND OTHER FURNACES, AND FOR ECONOMISING THE FUEL CONSUMED IN SUCH FURNACES," to be as follows:—

It is well known that in order to prevent dense or black smoke from issuing from furnaces it is necessary to admit an additional quantity of air, or it may be steam and air into the furnaces immediately after stoking or feeding of fuel in order to consume the extra quantity of gas and smoke evolved at such time, and that by such gas and smoke being consumed by inflammable combustion the temperature of the flues is raised higher than otherwise would be the case if such extra gas and smoke were allowed to escape unconsumed.

It is also well known that after such gas and smoke ceases to be evolved the fire assumes an incandescent state, and that such extra quantity of air, if not then shut off, causes the temperature of the flues to be reduced, thereby requiring the furnaces to be fed oftener than would be necessary if such extra quantity of air were shut off immediately after such gas and smoke abated or ceased to be evolved.

My Invention relates to means by which this regulation or stoppage of the supply of air to the furnaces may be self-acting. For this purpose the extra quantity of air required for the combustion of the extra gases and smoke is admitted through an aperture or apertures at the front part of the furnaces, say at the door; or it may be at the back part or the bridge or other convenient part of the furnace that will admit of the extra quantity of air being brought in contact with the gases and smoke produced by the combustion of the fuel to cause their inflammable combustion, and these apertures have flaps or valves capable of closing them, and which are opened between the opening and closing of the furnace doors so as to admit the largest amount of air to pass on to the fresh fuel immediately the furnace door is closed. This extra quantity of air does not require to be shut off until the fuel ceases partially or wholly to evolve gases and smoke, and the fire becomes incandescent. In order that this shutting off of the supply of air may take place at the required time I apply to the flues of the furnaces a metallic rod, cord, wire, or other connection capable of ready expansion by heat and contraction by cold, such metallic connection being connected by lever apparatus to the valve apparatus to close the same at the time referred to.

The combustion of the extra gases in the furnaces will cause the flame to extend along these flues, and thereby raise the temperature and cause the expansion of the metallic connection to the flaps, valves, or covers, but which will not effect such air passages whilst such connection is expanding. So soon however as the fuel in the furnace becomes incandescent and the flame ceases to extend along the flues the metallic connection contracts by cooling in temperature, and in contracting acts upon the covers to the air passages to close them at the required time, thus preserving the heat obtained in the flues longer than would be the case if the air were not shut off when required.

Such expanding and contracting connection in the flues may have an indicator applied to it to indicate the extent of heat in such flues, and thus act as a pyrometrical apparatus.

By one arrangement this metallic connection is connected to a spring or weighted rod, and that rod is connected to the lever apparatus so as to slip on or through it without affecting it during expansion, but so soon as contraction begins click or lever pressure operates to produce contact between the parts so as to effect the closing of the air passages.

The action of the air may be aided by a jet or jets of steam.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Samuel Stell in the Great Seal Patent Office on the 9th July 1873.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, Samuel Stell, of Brunswick Street, Keighley, in the County of York, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of January, in the year of our Lord One thousand eight hundred and seventy-three, in the thirty-sixth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Samuel Stell, Her special license, that I, the said Samuel Stell, my executors, administrators, and assigns, or such others as I, the said Samuel Stell, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time, and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "Improvements in Apparatus for the Prevention of Dense Smoke being Emitted from the Chimneys of Steam Boiler and other Furnaces, and for Economising the Fuel Consumed in such Furnaces," upon the condition (amongst others) that I, the said Samuel Stell, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Samuel Stell, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:—

It is well known that in order to prevent dense or black smoke from issuing from furnaces it is necessary to admit an additional quantity of air, or it may be steam and air into the furnaces immediately after stoking or feeding of fuel in order to consume the extra quantity of gas and smoke evolved at such time, and that by such gas and smoke being consumed by inflammable combustion the temperature of the flues is raised higher than otherwise would be the case if such extra gas and smoke were allowed to escape unconsumed.

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The action of the air may be aided by a jet or jets of steam.

But that the Invention may be fully understood I will by the aid of the accompanying Drawings proceed to describe means pursued by me in carrying the same into effect.

DESCRIPTION OF THE DRAWINGS.

Figure 1 shews a front view and Figure 2 a side view of parts of a boiler and furnace with apparatus arranged according to my Invention. Figure 3 represents parts separately. In each of the views the same letters indicate corresponding parts.

A represents the boiler; B, the brickwork or setting thereof. E is the internal tube or flue for the fire-place and passage of the products of combustion therefrom. C is the fire-box door. H is a small rocking shaft supported to turn in bearings carried by the door C, and having affixed to or formed on it arms G and F. The arm F is jointed by a hinged joint at about the middle of its length, so that when the door C opens the jointed end allows the arm F to pass the end of the lever J, but when the door C shuts the arm F rests against the lever J, the hinge piece being formed to turn only one way. D is a trap door under the bridge at the back of the fire to let in the air beyond the bridge. W is a connecting rod from the door D to the arm G. *m* is a metallic wire or rod fixed at one end in the side flue at X, and at its other end to a chain *n*, which is passed over a small guide pulley *o* and then coiled round the pulley V. The pulley O is capable of turning loosely on the projecting stud P standing out from the brickwork. N is a weight to the end of the chain *n* to keep the wire or rod stretched. The pulley V is fixed to the friction disc or pulley K, which is capable of turning loosely on the stud *r* standing out from the brickwork. L is a stationary index plate fixed at the end of the stud *r*. R is a spur wheel fixed on the friction disc or pulley K, and the teeth of which take into the teeth of the small pinion S. This pinion S is fixed at one end of the shaft T, at the other end of which is fixed a pointer U. The lever J is formed open to receive the disc K within it, and the fulcrum of this lever J is the axis of the disc K. Y is a friction click carried by the lever J, and which only clicks when the wire *m* is contracting. *d* is a fixed stop for the lever J to rest against. M is a counterpoise weight in order that when the click is released the lever J may go against the stop *d*.

When the wire or rod *m* contracts by the flues getting cool after the smoke from the fire-place has been consumed it acts by the chain *n* to turn the disc K, when the disc K acts on the click V to cause it to lower the outer end of the lever J until it gets below the arm F of the rocking shaft H, and allows it to drop and close the trap door D, thereby shutting off the air through that passage. The spur wheel R being fixed to the disc K works the pinion S on the shaft T, and consequently it works the pointer to indicate when the flues are hot or cool. The disc K is continually turning on its axis as the wire or rod *n* expands or contracts, but the lever J is only moved when the wire is contracting. The connecting rod W which connects the trapdoor D is jointed to the arm G immediately under the centre of the hinges of the fire-door C, so that whether the fire-door C is opened or shut it does not affect the trapdoor D. The trapdoor D is opened when the fire-door C is shut by the arm F catching and resting against the lever J, or it may be opened by hand by pulling the arm F so as to catch the lever J after the door is shut.

Figures 3 and 4 show by a front view and plan the lever J and parts thereof without the index plate or heat indicator.

Figures 5, 6, and 7 show another method of working the lever J. In this case A, A, are friction plates, which are caused to nip against the lever J by the two springs B, B, with sufficient pressure to work the lever J. The weight *m* just balances the lever J, and the weight N is sufficiently heavy that when the wire is expanding and the lever J is against the stop *d* the friction plates slip on the lever J and allow the wire to be kept stretched.

Having thus described my Invention and means which I adopt in carrying the same into effect, I would have it understood that I do not confine myself to the precise details shown and described, as these may be varied without departing from the peculiar character of the Invention, but what I claim is the arranging or combining parts for the prevention of dense smoke being emitted from the chimneys of steam boiler and other furnaces, and for economizing fuel consumed in such furnaces by the use of a rod, cord, or wire, or such like suitable connecting means applied in the flues, and acting substantially as described.

In witness whereof, I, the said Samuel Stell, have hereunto set my hand and seal, this Fourth day of July, in the year of our Lord One thousand eight hundred and seventy-three.

SAMUEL STELL. (L.S.)

LONDON:
Printed by George Edward Eyre and William Spottiswoode,
Printers to the Queen's most Excellent Majesty. 1873.

A.D. 1873. Jan. 11. No. 111.
STELL'S SPECIFICATION.

(1 SHEET)

FIG. 3.

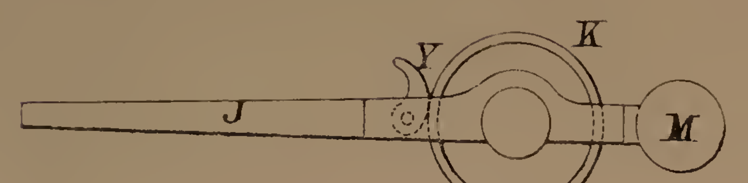


FIG. 4.

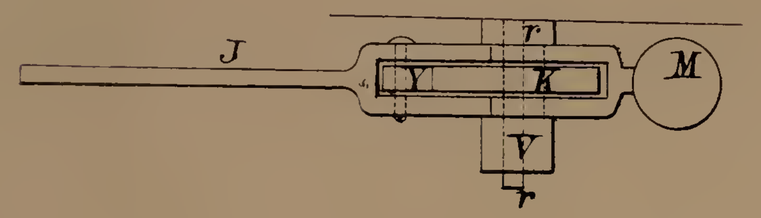


FIG. 5.

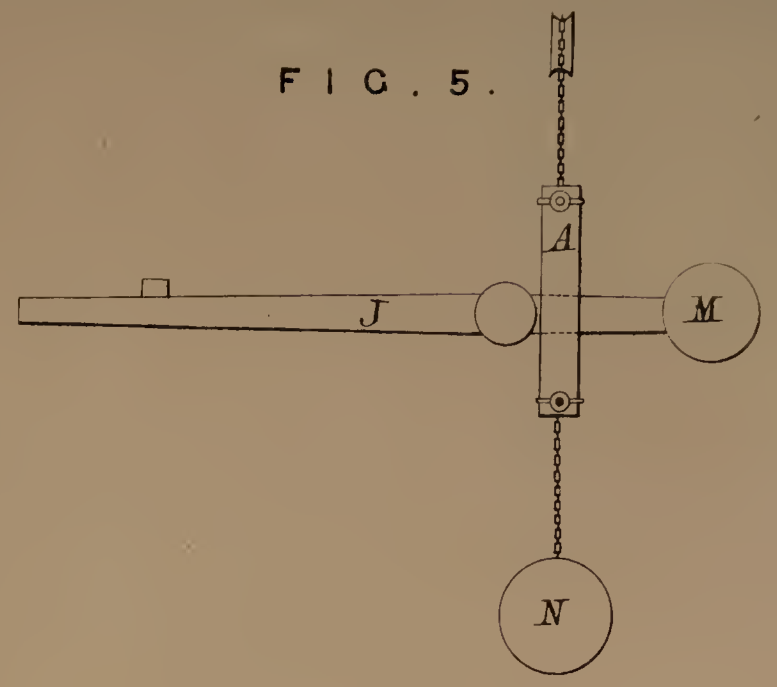


FIG. 6.

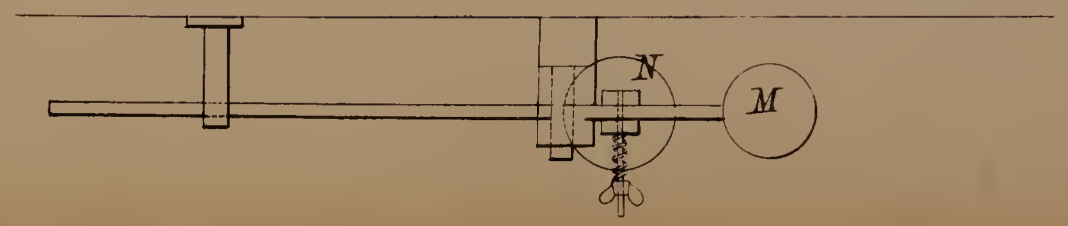


FIG. 7.

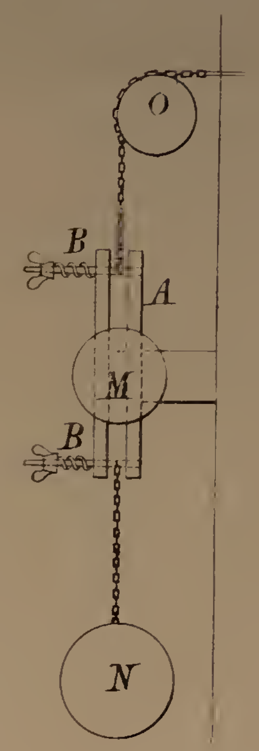


FIG. 1.

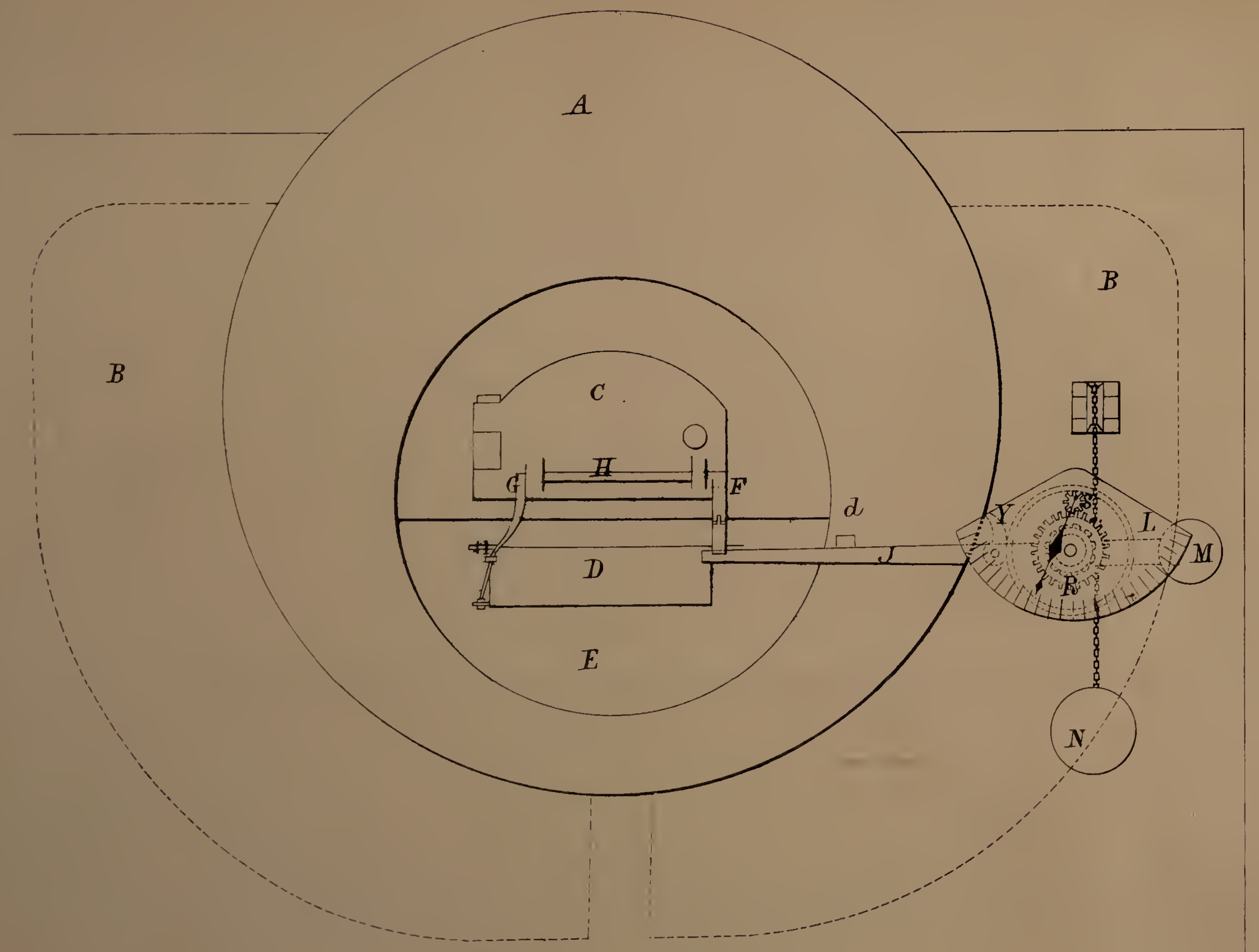
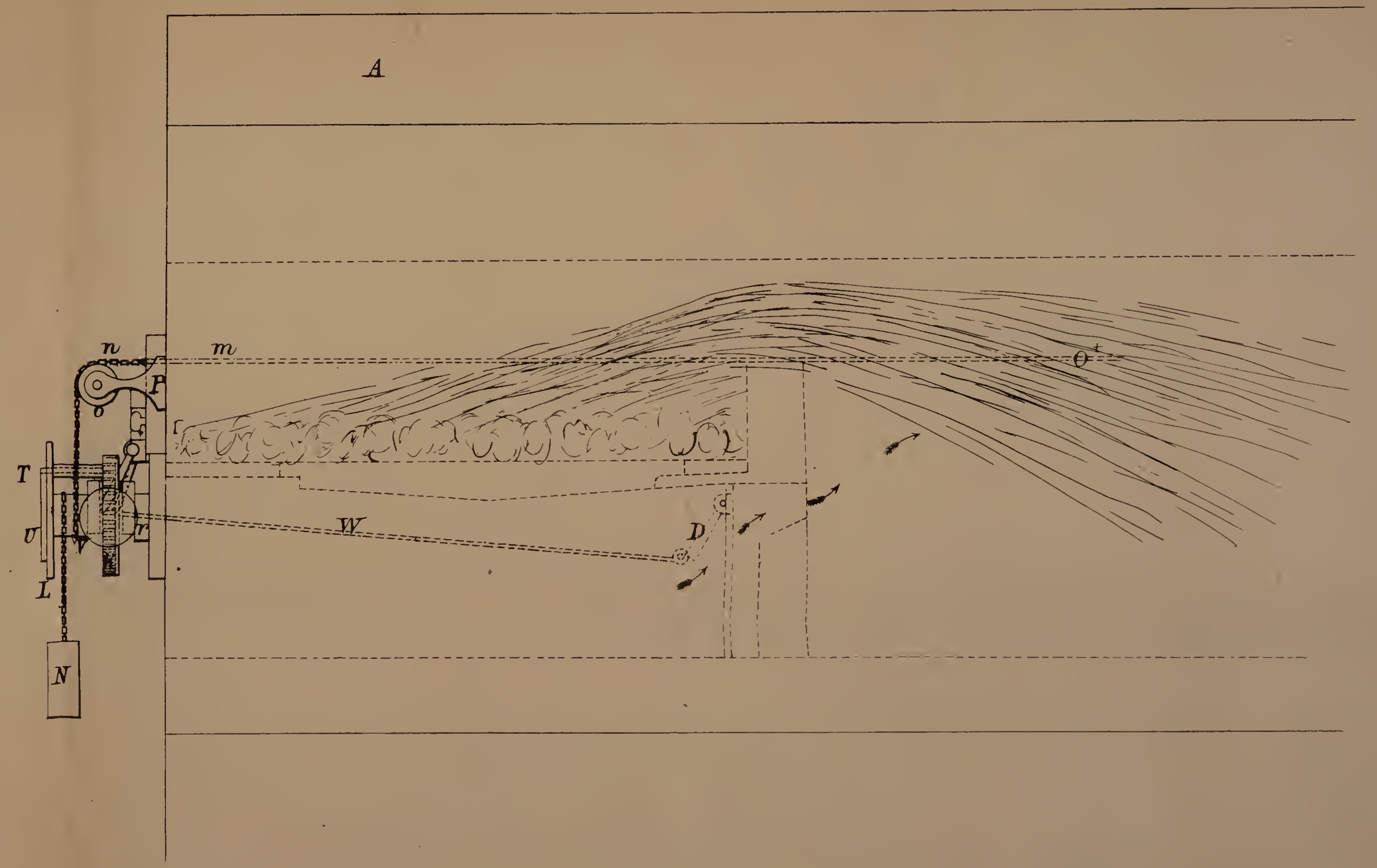


FIG. 2.



The filed drawing is not colored.

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LONDON Printed by George Edward Eyre and William Spottiswoode
Printers to the Queen's most Excellent Majesty 1873